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DO FRAIL, DISABLED, POOR, AND VERY OLD MEDICARE BENEFICIARIES HAVE HIGHER HOSPITAL CHARGES?

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ABSTRACT

For the 60 most frequent DRGs (representing 65 percent of Medicare admissions), we examined effect on average charges per hospital admission of being a member of any of 8 groups of Medicare beneficiaries: the disabled, those also enrolled in Medicaid, those admitted from nursing homes, those with a previous hospitalization in the same year, those over 80, those over 85, those previously hospitalized in the same year, those with end-stage renal disease, and those over 65 who had been disabled below age 65. We controlled statistically for differences both in hospitals used and in case mix as measured by DRG. The largest effect of being a member of any group examined was a 6.0 percent increase in average charges (patients admitted from a nursing home). For the two smallest groups, nursing home admissions and end-stage renal disease patients, there were numerous individual DRGs with larger differences, but for other groups differences greater than 20% were rare among the 20 most frequent DRGs. These results do not provide information on the appropriateness of cost differences between hospitals with different shares of special beneficiary groups. We conclude that 1) the Medicare Prospective Payment System, which is based on DRGs, does not create general economic incentives for hospital managers to avoid these classes of Medicare beneficiaries, and 2) including these beneficiary characteristics in the DRG system would produce only modest improvements.

DO THE FRAIL, DISABLED, POOR, AND VERY OLD HAVE HIGHER HOSPITAL CHARGES WITHIN DRGS?

A number of writers[1-3] have suggested that an episode of inpatient care is significantly more costly for the frail, the very old, the disabled, and the poor than for other patients with the same diagnoses who receive the same major procedures. This possibility raises serious problems for the Medicare Prospective Payment System and for other payors which use Diagnosis-Related Groups (DRGs) for payment, because DRGs Groups depend almost wholly on diagnoses and procedures to classify patients. The possibility that these vulnerable groups of patients have higher costs than others in the same DRG has two important implications: (1) recognizing the differences among groups of patients could provide a relatively simple strategy for refining the DRG system, and (2) if these problems are present and not corrected they could give hospitals incentives to discriminate against vulnerable groups of Medicare beneficiaries.

Costs vary substantially among patients classified into the same DRG; the average coefficient of variation for costs of patients in a DRG is 0.82 (unpublished Health Care Financing Administration data). If that variation were systematically associated with beneficiary characteristics, then Medicare might overpay or underpay for the care of beneficiaries with those characteristics.

Although DRGs use age to classify patients, special costs associated with the very old might not be recognized because DRGs were developed using a national data base in which the very old were a relatively small group. Designers of the DRG system did not have available information as to whether patients were disabled, had been admitted from nursing homes, or had been previously hospitalized. Although principal source of payment was available, patients who received both Medicare and Medicaid could not be identified.

METHODS

We designed this study to test the hypothesis that certain groups of Medicare beneficiaries are systematically more expensive to care for than others who fall in the same DRG.

A. DATA BASE. The data base was a 5% sample of Medicare hospital discharges in fiscal year 1983, which was the last year before introduction of the Medicare Prospective Payment System and the most recent year for which the necessary data are available. For this analysis, the discharge record was merged with patient eligibility data from a patient-oriented record and with a record of physician bills. Because the record of physician bills is a 5% sample of Medicare beneficiaries, the total merged file was limited to 530,693 discharges. We deleted all cases with zero charges and those which could not be assigned to a valid DRG, leaving 504,737 discharges for analysis. Since Medicare cost reports are not available from 1983, we used charges for covered hospital services as a measure of resource use.

This data base is a one-year sample. Therefore, patient classifications based on care within the 12 months prior to admission (beneficiary groups 1 and 2 described below) are actually based on data for the portion of those 12 months which fell within the sample year. This might slightly diminish differences for those beneficiary groups.

B. BENEFICIARY GROUP DEFINITIONS. We defined nine groups of beneficiaries:

1. Nursing Home Resident. Beneficiaries who had a Medicare Part B

service with location-of-service coded as "long-term care facility", during the study year but prior to the index admission.

2. Previous Hospitalization. Beneficiaries who had a record of hospitalization during the study year but prior to the index admission.

3. Poor. Beneficiaries for whom Medicaid was paying the Medicare Part B premiums.

4. Aged. Beneficiaries who were over 80 at the time of admission.

5. Very aged. Beneficiaries who were over 85 at the time of admission.

6. Younger disabled. Beneficiaries who were eligible for Medicare because of disability and were under 65 at the time of admission.

7. Younger endstage renal disease. Beneficiaries who were eligible for Medicare because of end stage renal disease and were under 65 at the time of admission.

8. Older disabled. Beneficiaries who were originally eligible for Medicare because of disability but were over 65 at the time of admission.

C. COMPARISON FOR GROUPS OF DRGs. Patient charges vary widely according to the hospital in which care is rendered and the DRG in which the discharge falls. In order to compare charges for members and non-members of beneficiary groups, we therefore controlled statistically for both the hospital and the DRG. We compared the beneficiary groups using the General Linear Models (GLM) procedure of the Statistical Analysis System, in which we controlled for hospitals as covariates using the Absorb feature of GLM and controlled for DRGs by treating DRGs as dummy variables. Since using 468 dummy variables is computationally impractical, we computed effects for 3 separate subsamples of the populations: all discharges falling in the 60 most frequent DRGs, all discharges falling in the next most frequent 60 DRGs; and and all discharges falling in 60 randomly selected DRGs. The dependent variable was the logarithm of covered charges because charges are approximately log-normally distributed. Using this dependent variable, the regression coefficient is the log of the ratio of covered charges for the beneficiary group to covered charges for similar patients who are not members of the benficiary group.

D. COMPARISONS FOR INDIVIDUAL DRGs. We further examined the relative costliness of different beneficiary groups for individual DRGs to determine whether effects might exist for individual DRGs which were obscured by averaging. For each beneficiary group, we examined the 20 DRGs which were most frequent for that group; small sample size and concentration of discharges limited us to the 10 most frequent DRGs for beneficiaries with endstage renal disease. For each DRG, we coded a dummy if the patient was assigned to the DRG and was a member of the beneficiary group and another dummy when the patient was assigned to the DRG and was not a member of the beneficiary group. For the DRG, the ratio of charges for members of the beneficiary group to charges for non-members of the group was therefore equal to the antilog of the difference between the regression coefficients for the two dummies associated with the DRG.

RESULTS

A. OVERALL FREQUENCIES. Table 1 gives, for each beneficiary group examined, the percent of the total sample falling in the group, and the percentage of total discharges for the group which were in the 60 most frequent DRGs, the next most frequent 60 DRGs, in 60 random DRGs, and in the 20 DRGs which were most frequent for that group. The most frequent 60

DRGs account for 65.16 percent of all discharges, the next most frequent 60 DRGs account for 16.25 percent, and the 60 random DRGs account for 14.66 percent.

B. NURSING HOME RESIDENTS. We identified 4.41 percent of discharges as nursing home residents by the presence of at least one bill for service in a longterm care facility during 1985 but prior to hospitalization. These beneficiaries had charges 6.0 percent higher than other beneficiaries for the 60 most frequent DRGs (Table 2). Relative charges are similar for the next most frequent 60 DRGs, but for 60 randomly selected DRGs the relative charges for nursing home residents are 13.9 percent higher. In this beneficiary group the difference in charges varies markedly across DRGs. Table 3 shows that charges for beneficiaries admitted from nursing homes are more than 10 percent above or below those for other beneficiaries in 11 of the 20 most frequent DRGs for this beneficiary group. Table 4 shows the relative charge for each of these 20 DRGs.

C. BENEFICIARIES WITH PREVIOUS HOSPITALIZATION. More than a third (37.40 percent) of beneficiaries had a previous hospitalization in the same year. These beneficiaries have charges 1.3 to 3.0 percent higher than other beneficiaries. Although differences in charge ratios for different groups of DRGs are statistically significant, they are very small.

D. THE POOR. We found that 9.78 percent of Medicare beneficiaries were also enrolled in Medicaid. These beneficiaries had charges which were slightly (1.9 percent) but significantly lower than other beneficiaries for the most frequent 60 DRGs but which are not significantly different from other beneficiaries for other DRG groups. Table 3 shows that the difference in charges for this beneficiary group varies little across DRGs.

E. THE OLD. Beneficiaries older than 79 comprised 22.66 percent of the sample and had charges 1.8 to 5.2 percent higher than younger beneficiaries (Table 2). Table 3 shows that relative charges do not vary widely from DRG to DRG.

Of beneficiaries over 79, 8.0 percent were admitted from nursing homes. For the 60 most frequent DRGs, charges for these beneficiaries were 3.7 percent higher than for other beneficiaries ($p<.001$; data not in Tables 2 and 3) compared to 3.0 percent higher for all patients over 79 (Table 2). Age and admission from a nursing home do not, therefore, have a significant cumulative effect.

F. THE VERY OLD. Beneficiaries older than 84 accounted for 10.00 percent of the sample discharges. They had relative charges almost exactly equal to those for other beneficiaries, regardless of the group of DRGs examined. Because beneficiaries over 84 were included in the group over 79, this comparison actually reflects relative charges for those over 84 compared to those 80-84 rather than compared with the entire beneficiary population. Relative charges vary little from DRG to DRG.

G. THE YOUNGER DISABLED. Medicare beneficiaries who are under 65 and disabled accounted for 9.58 percent of discharges. Their relative charges were slightly (1.8 percent) but significantly lower than other beneficiaries for the most frequent 60 DRGs but were not significantly different from other beneficiaries for other DRG groups. Relative charges varied little across DRGs.

H. YOUNGER ENDSTAGE RENAL DISEASE PATIENTS. These beneficiaries account for 0.97 percent of sample discharges. They show the most heterogeneous patterns of all beneficiary groups. For the 60 most frequent DRGs, their costs are 3.2 percent lower than other beneficiaries; for the next most frequent 60 DRGs their charges are 17.0 percent higher, and for the 60 random DRGs their charges are 13.2 percent higher. These variations partly reflect a relatively small sample size, but the statistical tests of significance suggest that small sample size does not explain the picture. Rather, the interaction of renal disease with hospital charges varies widely across DRG, and renal disease discharges concentrate highly in just a few DRGs. Table 1 shows that 65.2 percent of younger renal disease patients are in the 20 most frequent DRGs; no other beneficiary group has more than 54.7 percent in the 20 most frequent, and most have less than half. Table 3 shows that charge ratios vary widely by DRG.

I. OLDER DISABLED. Beneficiaries who were originally eligible for Medicare because of disability, but who are now over 64, have charges 5.4 to 8.7 percent higher than other patients, according to the group of DRGs examined. Table 4 shows almost no variation by DRG.

IV. DISCUSSION

A. USE OF CHARGES RATHER THAN COSTS. Costs are generally preferred to charges in making comparisons of this kind. However, when comparisons are made within the same DRG and the same hospital (which is the effect of controlling for hospital and DRG in the analysis), the structure of costs and therefore the relation of charges to costs, is likely to be very similar among patients. A second point in favor of charge comparisons is that these are the comparisons which a hospital manager is likely to see; if a hospital manager knows that charges are comparable for different groups of Medicare beneficiaries, he is unlikely to see ground for discriminating among those beneficiaries.

B. DIFFERENCE BETWEEN 60 MOST FREQUENT DRGs AND RANDOM SAMPLE. The results using a random sample of DRGs are not identical with those using the 60 most frequent DRGs. This shows that the most frequent DRGs are not typical of all DRGs and suggests that a random sample of DRGs does not give a representative sample of patients. Given the impracticality of using a substantially larger number of DRGs, and the very much smaller size of the random sample (73,998 cases v. 328,897 cases), we regard the results from the most frequent DRGs as a fairer prediction of the real relationship between charges for the different groups.

C. RELATION TO THE "DISPROPORTIONATE SHARE" ISSUE. The Social Security Amendments of 1983 directed the Secretary of the Department of Health and Human Services to make arrangement for special payment rates for hospitals with a disproportionate share of Medicaid, Medicare, and low income patients. The analysis in this paper controls for interhospital variation and uses the patient as the unit of analysis, and therefore does not reflect on the hypothesis that "disproportionate share" hospitals have higher costs. Moreover, because this analysis does not examine the interaction between hospital type and patient characteristics, it does not show whether disproportionate share hospitals have a more expensive case mix. This analysis does suggest that Medicaid-eligible Medicare beneficiaries in disproportionate share hospitals are likely not to have greater costs than other Medicare beneficiaries, but is not conclusive even on this point because hospital characteristics were not available for the analysis. We are therefore also unable to rule out the possibility that disproportionate share patients may be more expensive in some hospitals.

D. DRG REFINEMENT. This analysis does not support the hypothesis that DRGs can generally be refined by including simple beneficiary characteristics such as disability, age, Medicaid eligibility, or previous hospitalization. Even when we examine the findings DRG by DRG, there are few cases in which a DRG could be substantially improved by taking account of the beneficiary characteristics examined in this study. However, the large differences observed for some DRGs suggest possibility for specific improvements when cost data is available for treatment rendered under the Medicare prospective payment system. The small increases in charges for the elderly also suggest possible minor but useful DRG refinements.

E. INCENTIVES FOR DISCRIMINATION. These findings suggest that a hospital manager would not be prudent to discriminate against any of the beneficiary groups examined in this study in the hope of thus improving profits. The largest differences (about 6 percent for nursing home discharges) are so small compared to the average variability of case costs within DRGs (about 82 percent) as to make a strategy of this kind unpromising.

F. CONSISTENCY WITH OTHER FINDINGS. Although Lubitz and Pine[4] showed that the annual cost of care for disabled Medicare beneficiaries is greater than for other Medicare beneficiaries, these costs do not appear to result from increased cost per admission. Although Morrison et al[5] showed that psychiatric admissions per disabled Medicare beneficiary far exceed admissions per non-disabled beneficiary, disabled beneficiaries had shorter stays than the non-disabled, a finding confirmed by Carl Taube at NIMH (personal communication). Carter and Ginzburg[6] showed a slight increase in cost per admission with increasing age which is consistent both in magnitude and direction with current findings.

These findings run contrary, however, to intuitive expectation that the frail, the poor, the very old, and the disabled are sicker and therefore will have higher per-admission costs. Four explanations appear possible:

--The DRG system may identify the factors which are responsible for differences in cost.

--Although these special groups may have more severe illness, there may be no efficacious treatments for the conditions which make them sicker, and their increased severity of illness therefore does not result in increased costs. For example, disabling illnesses must have persisted for two years in order that the disabled be eligible for Medicare, which may mean that the opportunity for curative interventions is lower. Nursing home residents and the very elderly may tend to receive palliative and supportive rather than curative care.

--Increased severity of illness may be reflected in more frequent admissions rather than more intense care during individual admissions.

--Although Medicaid-eligible Medicare beneficiaries may be, because of poverty, less well cared for and though they may have homes which provide such poor support that hospitalization is extended, this does not necessarily raise the average cost per admission. These same factors would tend to lead to short and inexpensive admissions which would not be necessary at all in patients with better home support. For example, a patient with a supportive home and a serious respiratory infection might be managed at home while a patient with a similar infection might require admission if there were no one to provide supervision at home.

All of these interpretations suggest that the relation of severity of illness to cost of a hospitalization is either very complex or relatively weak.

V. CONCLUSIONS

This study suggests that using the DRG system to pay for inpatient care to Medicare beneficiaries does not create substantial incentives to discriminate against the most vulnerable classes of Medicare beneficiaries. Incentives do occur for a few DRGs and a few beneficiary groups but are small compared to the basic uncertainties a hospital faces under case-based reimbursement. Conversely, only modest improvements in DRGs can be accomplished through using any of the beneficiary characteristics we have examined.

TABLE 1

FREQUENCY OF BENEFICIARY GROUPS IN 5 PERCENT SAMPLE OF 1983 DISCHARGES, 60 MOST FREQUENT DRGs, AND 60 RANDOMLY SELECTED DRGs

Beneficiary Group	Percent of Total Sample in Benef. Group	Percent of Beneficiary Group In: Most Frequent 60 DRGs	Next Most Frequent 60 DRGs	Random 60 DRGs	20 Most Common DRGs for Group
1. Nursing Home Resident.	4.41	70.04	15.31	15.98	49.96
2. Previous Hospitalization.	37.40	64.22	16.93	16.40	40.14
3. Medicaid Enrollee	9.78	67.58	15.44	13.09	44.35
4. Aged (>79).	22.66	75.16	13.27	15.37	52.31
5. Very aged (>84)	10.00	76.48	12.68	16.14	54.70
6. Younger disabled (<65)	9.58	52.23	19.39	13.28	45.68
7. Younger endstage renal disease	0.97	46.36	18.52	7.70	65.21
8. Older disabled. (>64)	7.34	62.19	16.87	16.30	43.53
All Beneficiaries	100.00	65.16	16.25	14.66	
Discharges in Group	504,737	328,897	82,027	73,998	

TABLE 2

RELATIVE CHARGES FOR BENEFICIARY GROUPS COMPARED TO OTHER BENEFICIARIES CONTROLLING FOR DRG AND HOSPITAL IN WHICH CARE WAS RENDERED
5 Percent Sample of 1983 Medicare Hospitalizations

	THREE DIFFERENT GROUPS OF 60 DRGs EACH		
Beneficiary Group	MOST FREQUENT 60 DRGs	NEXT MOST FREQUENT 60 DRGs	60 RANDOM DRGs
1. Nursing Home Resident.	1.0598***	1.0656***	1.1389***
2. Previous Hospitalization.	1.0258***	1.0148*	1.0133*
3. Medicaid Enrollee	0.9807***	0.9902	0.9889
4. Aged (>79).	1.0301***	1.0521***	1.0179
5. Very aged (>84).	0.9905*	1.0091	0.9902
6. Younger disabled. <65)	0.9821***	0.9999	0.9999
7. Younger endstage renal disease.	0.9680*	1.1705***	1.1319**
8. Older disabled. (>64)	1.0535***	1.0872***	1.0646***

* p <.05 that ratio is = 1.00 for total population.
** p <.01 that ratio is = 1.00 for total population.
*** p <.001 that ratio is = 1.00 for total population.

TABLE 3

Number of DRGs Among 20 Most Frequent DRGs for Each Beneficiary Group For Which Relative Charges Differ from those for Other Beneficiaries By Different Amounts

Beneficiary Group	>20 percent greater	10-20 percent greater	less than 10 percent difference	10-20 percent less	>20 percent less
1. Nursing Home Resident.	4	2	9	5	0
2. Previous Hospitalization.	1	2	17	0	0
3. Medicaid Enrollee	0	0	19	1	0
4. Aged (>79).	0	1	19	0	0
5. Very aged (>84).	0	1	19	0	0
6. Younger disabled. (<65)	0	0	17	1	2
7. Younger endstage renal disease.	3	1	3	1	2
8. Older disabled. (>64)	0	1	19	0	0

Because of limited sample size, only 10 DRGs were examined for endstage renal disease patients.

TABLE 4

RELATIVE CHARGES FOR NURSING HOME ADMISSIONS
20 MOST FREQUENT DRGs

DRG	Name	Relative Charge
89	Simple Pneumonia >69CC	1.053**
127	Heart failure & shock	1.097***
320	Kidney & urinary tract inf >69CC	1.230***
14	Specific cerebrovascular dis exc TIA	1.130***
182	Esophagitis, gastroenteritis >69CC	1.242***
296	Nutritional, metabolic disorders	1.186***
210	Hip & femur excpt maj joint >69CC	0.897***
39	Lens procedures	1.048
174	Gastrointestinal Hemorrhage >69CC	1.075
416	Septicemia, age >17	0.886**
88	Chronic Obstructive Pulmonary Dis	1.029
132	Atherosclerosis >69CC	1.046
294	Diabetes, age >35	1.233***
468	Surgery unrelated to principal dx	1.283***
209	Major joint procs & limb reattach	0.879**
138	Arrhythmia/conduction disorder >69CC	0.900*
15	Transient Ischemic Attack	0.936
96	Bronchitis & Asthma >69CC	1.115*
429	Organic Mental Disturbances	0.998
236	Fractures of hip and pelvis	0.893*

* p <.05 that relative charge is = 1.00 for total population.
** p <.01 that relative charge is = 1.00 for total population.
*** p <.001 that relative charge is = 1.00 for total population.

>69CC = age over 69 and/or comorbid or complicating secondary diagnosis.

These DRGs account for 174034 observations or 34.48 percent of admissions.

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